Water Withdrawal And Conservation Practices

Prepared for Michigan Chamber of Commerce

February 2008

Submitted by Barr Engineering Company

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1. Introduction

Foreword

The Great Lakes region, with 20 percent of the world's surface freshwater, is not immune to the concerns with water supply and availability. Increasing interest from other areas of the country that are experiencing population growth, but lack the water resources to sustain the growth create greater need for us to develop a basis on which to justify control of water use in the Great Lakes Basin. Additional concerns that are driving increased attention to water efficiency and conservation actions are the increasing costs associated with maintaining and upgrading our nation's water supply and wastewater treatment systems – the EPA estimates the national water infrastructure investment gap will exceed a half-trillion dollars over the next 15 years. Another issue is the increased urbanization and growth of impervious surfaces across our national landscape. Rainfall entering the groundwater is reduced by 15-37 percent due to impervious surfaces preventing water from seeping into the ground. This greatly impacts the quantity and availability of fresh water in many areas of the country.

In response to these concerns, the Great Lakes governors, along with the premiers of Ontario and Quebec, have negotiated a new bi-national compact that is intended to protect the Great Lakes from the potentially adverse consequences of diversions of water to regions outside the Great Lakes basin. As part of the Compact, the governors and premiers have committed to developing regional water conservation and efficiency objectives.

To assist in meeting these water conservation and efficiency objectives, employers are being encouraged to look at water usage at their own facilities and to ask the question, "Are there feasible, cost-effective, water management measures that could improve water use efficiency and create cost-saving opportunities in my industrial processes or in the way I manage my stormwater or landscaping?" Employers can also encourage their own suppliers to be alert to opportunities for reducing costs through water and energy efficiency. For businesses in Michigan, there is a clear relationship between water efficiency and energy efficiency; improving both in a voluntary manner can lead to an improved bottom line and community reputation.

Background and Purpose

Public Act 35 of 2006 required each water use sector to begin designing guidelines for generally accepted water management practices or environmentally sound and economically feasible water conservation measures within 12 months after the effective date of the Act. The business sectors met this requirement on February 28, 2007 (see Appendix A). Within 24 months after the effective date of the Act (on or before February 28, 2008), the Michigan Department of Environmental Quality (MDEQ) must review and report to the appropriate standing committees of the Michigan Legislature on whether there are reasonably detailed criteria for assisting facilities in determining whether water is being used in an efficient manner. The Act allows for established statewide professional or trade associations representing a sector to adopt such guidelines as a means of showing compliance with the provisions of the Act.

In light of the Act's authorization of professional or trade associations to adopt such guidelines as a means of compliance, the Michigan Chamber of Commerce (Chamber) has worked with industry representatives to develop a general model guideline, which can be utilized by industrial and

commercial businesses in Michigan. In addition, members from the Electric Utility, Chemical Manufacturing, Pharmaceutical Manufacturing and Research, Pulp and Paper, and the Beverage Industry sectors developed sector-specific model guidelines that can be used by water users in those sectors. These five sectors represent over 80% of water withdrawals in 2004 according to data available on the MDEQ's "Water Use Program" website. As the program matures, additional business sectors may choose to develop sector-specific model guidelines. This collaborative approach to developing voluntary conservation guidelines on a sector-by-sector basis meets the intentions of Public Act 35 of 2006. By involving a variety of sectors in the discussion, the Chamber has facilitated the sharing of information and experience for the mutual benefit of all of the participants in the discussion.

The Chamber recognizes that the development of the guidelines, as set forth in PA 35 of 2006, also meets the requirements of the Great Lakes Charter Annex Compact, and is consistent with the recommendations of the Groundwater Advisory Council. Specifically, Article 203 of the Proposed Compact (The Decision-Making Standard for Management of Withdrawals and Consumptive Uses within the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement), states:

> *"The withdrawal or consumptive use shall be implemented so as to incorporate environmentally sound and economically feasible water conservation measures."*

The Groundwater Conservation Advisory Council's February 6, 2006 Final Report to the Legislature provided several recommendations. Within them, Recommendation # 10 states:

> *"Each water-use sector should develop its own sector-specific water management practice. These should be reviewed and evaluated by a closely related professional or trade association. Water users within each sector should be encouraged to adopt and implement the water-management practices specific to their sector."*

The Chamber is encouraged by the consistent message from all parties involved with water conservation measures and is committed to the development of a successful program. With the support of highly experienced and motivated membership, the Chamber is confident the General Model guideline and sector-specific guidelines developed for the Electric Utility, Chemical Manufacturing, Pharmaceutical Manufacturing and Research, Pulp and Paper, Beverage, and Wet Cement Manufacturing Industry sectors will exemplify environmentally sound and economically feasible water conservation measures through consideration of generally accepted water management practices.

The general industry model guideline and sector-specific guidelines are intended to satisfy the water withdrawal requirements under PA 35 of 2006. These withdrawals include:

- Increased withdrawal capacity of more than 2 million gallons per day (MGD) for withdrawals from the waters of the state, other than the Great Lakes and their connecting waterways.
- New or increased withdrawals of more than 5 MGD for withdrawals from a Great Lake or one of the connecting channels.

In support of these guidelines, the Chamber has adopted a position statement presented in Section 2.

2. Position Statement

Water Efficiency – Resource Sustainability – Conservation Management

The Michigan Chamber of Commerce (Chamber) supports voluntary water management programs that protect the Great Lake's waters. The Chamber further supports the development of a sustainable approach to water resource management and a goal of water use efficiency by incorporating conservation strategies at the discretion of each sector and the corresponding facilities for their particular circumstance.

Because each facility in a water use sector has distinctive and unique circumstances, the Chamber urges flexibility in developing water conservation and efficiency management plans. Each facility must be attentive to its own operation, and make reasonable decisions to accomplish efficient use of water resources. This is accomplished by conducting its own cost benefit analysis of each feasible and potentially cost-effective water conservation activity.

An abundant, renewable, and safe water supply is an economic advantage Michigan currently enjoys in attracting and retaining business, industry and tourism. Considering the implementation of environmentally sound and economically feasible water conservation measures will continue to provide this economic advantage.

The Chamber and its members have adopted, as its goal, the promotion of sound water conservation and management practices in Michigan.

Our Goal Statement

The goal of the Chamber's Water Withdrawal and Water Conservation initiative is to promote water conservation practices in Michigan, through a partnership with the business sectors that fosters awareness and promotes fiscally responsible and meaningful water management practices.

Our Objectives

The Chamber has established the following objectives:

- To establish a forum that serves to develop and disseminate water conservation information and activities to businesses.
- To accumulate educational materials in the form of generally accepted practices, guidebooks and checklists.
- To facilitate the development of generally accepted practices and water management activities among its members to satisfy the requirements of PA 35 of 2006 and the proposed Great Lakes Compact.

3. Generally Accepted Management Practices for Water Efficiency and Conservation

The following sub-sections list voluntary, generally accepted management practices (GAMPs) to assist the business sectors with their goal of improving water efficiency and water conservation. Factors to consider when evaluating the relative costs and benefits of each of the GAMPs are the potential short- and long-term economic impacts, process efficiency implications and potential impacts on other environmental media such as air, land and waste. For example, one of the management practices recommends considering the use of chemical treatment to reduce the amount of make-up water required for cooling towers. This may not be practical for cooling towers that discharge directly to a river since the permit for this discharge may restrict chemical addition to the cooling tower water. GAMPs include the measures listed below. It is recognized that any given GAMP may be operationally or economically infeasible, or otherwise be inappropriate for a unique industrial operation within the same sector. Each business will need to review and assess which GAMPs are potentially applicable to its specific circumstance.

Communication

- Incorporate water conservation policies and procedures into employee training programs.
- Post water-conservation stickers, signs, and posters in bathrooms, kitchens, cafeterias, conference rooms, and other places where employees congregate, to help raise awareness.
- Participate in water conservation advisory groups or similar organizations.

Process

- Maintain a general water use inventory for the facility and update periodically.
- Consider the impact of future facility modifications or production changes on water usage. Changes to routine operations provide a good opportunity to evaluate current practices for possible water conservation opportunities.
- Shut off faucets and nozzles when not in use.
- Install flow restrictors, aerators, spring-loaded valves and timers on faucets and nozzles.
- Improve rinse cycles by using cascading or counter-current rinsing from processes that require highly pure water to rinse parts from other processes that do not require such high-quality water.
- Investigate potential chemical treatments to reduce the amount of make-up water required for cooling towers, steam boilers, etc.
- Consider retrofit applications that use once-through cooling water (chillers, compressors, condensers etc.) with closed-loop recirculation systems, while keeping in mind that a decrease in water withdrawal for once-through cooling may increase overall process water consumption.
- Consider replacing water-cooled equipment with air-cooled equipment.
- Incorporate water conservation into ISO or other existing QA/QC processes.

Washrooms

- Replace continuous- or timed-flush urinals in restrooms with low-flow manual flush or sensor-controlled equipment. This can be as simple as retrofitting the flush valve with a new spring and diaphragm.
- Replace older toilets that use as much as 22 litres per flush with ultra-low-flush toilets (6 litres per flush) or dual-flush toilets (6 litres for solid waste, 3 litres for liquid waste).
- In new installations consider waterless urinals, which do not consume any water (eliminating water supply lines and flush valves), are easy to install and meet public health standards.

Landscaping

- Install soil-moisture sensors and controllers.
- Install drip irrigation to reduce water use in landscaped areas.
- Use more drought-tolerant native vegetation.
- Install trigger-heads or nozzles on hoses and devices used for cleaning and watering.

Appendix A – Links to Websites

North Carolina Department of Environmental and Natural Resources Water Efficiency Manual – www.p2pays.org/ref/01/00692.pdf

"Water efficiency" means using improved technologies and practices that deliver equal or better service with less water. For example, the use of low flow faucet aerators can be more powerful than no aerators for washing hands. "Water conservation" has been associated with curtailment of water use and doing "less" with less water, typically during a water shortage, such as a drought. Examples are minimizing lawn watering and automobile washing in order to conserve water. Water conservation also includes day-to-day "demand management" to better manage how and when water is used, so it is common to hear the words "water conservation" used synonymously with "water efficiency."

United States Environmental Protection Agency – Water Conservation Plan Guidelines – www.epa.gov/WaterSense/pubs/guide.htm

Water efficiency is the long-term ethic of conserving water resources through the employment of water-saving technologies.

Sandia National Laboratory – Energy-Water Report to Congress – www.sandia.gov/energy-water/congress_report.htm

This report summarizes the relationship between energy production and water use for the entire U.S. The report summarizes water use by sector (e.g., agriculture, power plants, oil and gas production, etc.) and as such, provides a valuable resource for states and regions that are wrestling with the water availability issue.

American Water Works Association

Water Conservation: The U.S. Water Resources Council defines water conservation as activities designed to (1) reduce the demand for water, (2) improve efficiency in use and reduce losses and waste of water, and (3) improve land management practices to conserve water.

Water Use Efficiency: A measure of the amount of water used versus the minimum amount required to perform a specific task. In irrigation, the amount of water beneficially applied divided by the total water applied.

MI-AWWA advocates water use efficiency and conservation planning as a resource management practice that incorporates analysis of costs and uses of water, specification of water-saving solutions, installation of water-saving measures, and verification of savings to maximize the cost effective use of the water resource. Refer to the **MI-AWWA Draft Guidelines for Generally Accepted Water Management Practices for the Public Water Supply Sector** – *http://www.mi-water.org/miawwa/committees/Water_Efficiency/Minutes/MIAWWA%20Water%20Mngmnt%20Guidelines%20Rev%20A%20081406.pdf*

New York State Department of Environmental Conservation – www.dec.ny.gov/lands/313.html

Conservation is simply a protection from loss of waste. Therefore, water conservation activities reduce the demand for water, improve the efficiency in use and reduce losses and waste of water. Short-term conservation measures (such as those for emergency or drought conditions) differ from long-term measures in terms of implementation time, degree of public cooperation, long-term effectiveness and influence on water supply planning.

SAHRA – Sustainability of Semi-Arid Hydrology and Riparian Areas – www.sahra.arizona.edu/programs/water_cons/why/definition.htm

Conservation is the management of resources, such as water, so as to eliminate waste or maximize efficiency of use. A related and complementary concept is sustainability. Activities are sustainable if they can be maintained over time without depleting the natural resource base. While water resources vary over time (as from drought, an abundant snowpack, etc.), sustainable use of water requires a reserve that can be maintained and managed so as to ensure the supply for future generations. Sustainable activities do not reduce options or otherwise impoverish future generations.

Michigan Department of Environmental Quality – Glossary of Terms and Acronyms – www.michigan.gov/documents/GLOSSARYOFTERMSSept13-2005_136497_7.pdf

Water and Soil Conservation: This simply means wisely using and maintaining our soils and water. Soil and water are essential to sustaining life and ecosystems. Soil conservation is wisely maintaining the soils which support forests, shrub lands, and grasslands. Water conservation is maintaining abundant and quality aquatic environments for plants and animals as well as providing quality water for people and wildlife.

Water Conservation and Use in Agriculture – www.wca-infonet.org/iptrid/infonet/index.jsp

With growing water scarcity and increasing competition across water using sectors, the need for water savings and more efficient water use has increased in importance in water resources management. Improvement in the physical efficiency of water use is related to water conservation through increasing the fraction of water beneficially used over water applied, while enhancing economic efficiency is a broader concept seeking the highest economic value of water use through both physical and managerial measures.

United States Department of Agriculture – Agriculture Water Use Efficiency in the United States – www.lanl.gov/chinawater/documents/usagwue.pdf

Conserve Water Georgia – Frequently asked questions – www.conservewatergeorgia.net/Documents/faq.html

Michigan Turf Grass Foundation – Best Management Practices for Non-Agricultural Irrigation – www.michiganturfgrass.org/uploads/Non-Ag_Irrigation_BMP_Oct_2005.pdf

Whole Building Design Guide – Water Conservation – www.wbdg.org/resources/water_conservation.php

Definitions of Water Conservation on the Web:

Water Environment Federation: Practices which reduce water use.

Environment Canada: The care, preservation, protection, and wise use of water. www.ec.gc.ca/water/en/info/gloss/e_gloss.htm

Colorado State University Extension: The wise use of water with methods ranging from more efficient practices in farm, home and industry to capturing water for use through water storage or conservation projects. www.ext.colostate.edu/pubs/crops/04717.html

Las Vegas Valley Water District: For information on rebates, services and products, see the Water Smart pages, call the Conservation Helpline at (702) 258-SAVE, or visit the Southern Nevada Water Authority's Website. www.lvvwd.com/html/pay_ebill_terms.html

Carpinteria Valley Water District: Using water wisely and efficiently so that it is not wasted. www.cvwd.net/water_glossary.htm

North Carolina Rural Economic Development Center: The protection, development, and efficient management of water resources for beneficial purposes. www.ncruralcenter.org/water2030/glossary.htm

EPA – Four Pillars of Sustainable Infrastructure – www.epa.gov/waterinfrastructure

EPA believes that better management practices, efficient water use, full-cost pricing of water and a watershed approach to protection can all help utilities to operate more sustainable now and in the long-term.

Better Management of water and wastewater utilities can encompass practices like asset management and environmental management systems. Consolidation and public/private partnerships could also offer utilities significant savings. www.epa.gov/waterinfrastructure/bettermanagement.html

Rates that reflect the Full Cost Pricing of service and rate restructuring can help utilities capture the actual costs of operating water systems, raise revenues, and also help to conserve water. www.epa.gov/waterinfrastructure/fullcostpricing.html

Efficient Water Use is critical, particularly in those parts of the country that are undergoing water shortages. We need to create market incentives to encourage more efficient use of water and to protect our sources of water. www.epa.gov/waterinfrastructure/waterefficiency.html

Watershed Approaches looks more broadly at water resources in a coordinated way, which is challenging because we have not traditionally thought of infrastructure management within the context of water quality protection. www.epa.gov/waterinfrastructure/watershedapproaches.html

Appendix B - Council of Great Lakes Governor's - Water Conservation and Efficiency Initiative

The following is the Council of Great Lakes Governor's (CGLG) Water Conservation and Efficiency Initiative report which was adopted on December 4, 2007. The objective of the Great Lakes Water Conservation and Efficiency Initiative is to provide recommendation to the CGLG regarding regional water conservation and efficiency goals and objectives.

Background

The Great Lakes governors and premiers signed the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement (Agreement) on December 13, 2005. This Agreement created the Great Lakes-St. Lawrence River Water Resources Regional Body (Regional Body), comprising the governors and premiers, to further coordinate implementation of its terms.

Pursuant to Article 304(l) of the Agreement, the Regional Body will adopt regional water conservation and efficiency objectives by December 13, 2007. These objectives are intended to be broad, overarching concepts which will provide context for further state and provincial action that will be more specific in nature. The Regional Body met this deadline with its December 4, 2007 action.

The process for developing the regional water conservation and efficiency objectives is intended to be open and transparent. Regional stakeholders have been asked to provide technical information, make recommendations and foster communication with interested organizations and individuals. Representatives of Tribes and First Nations have also been engaged and asked to share their experience and traditional knowledge. Additionally, public input was sought through a formal public comment period.

Once finalized and adopted by the Regional Body, the regional objectives will then be used to inform the development of individual state and provincial water conservation and efficiency goals and objectives. These goals and objectives will in turn shape state and provincial water conservation programs. The Agreement also provides direction to ensure that the states and provinces, along with the Regional Body, undertake periodic reviews of their water conservation programs. Additionally, the regional objectives, as well as reports prepared by each state and province on their programs, will be reviewed by the Regional Body every five years.

Introduction

Efficient and responsible water use is a cornerstone of sound water management policy, whether the resource is considered abundant or scarce. Efficient use and conservation of four water resources can:

- Ensure equitable access to, and long-term availability of, water
- Protect public health and enhance quality of life
- Minimize impacts of water use to support healthy aquatic ecosystems of the Great Lakes and St. Lawrence River Basin

- Minimize costs related to water and wastewater infrastructure
- Preserve social and cultural heritage
- Prevent or minimize conflicts among water users
- Enhance economic viability and competitiveness of the region
- Support reductions in energy use and greenhouse gas emissions
- Improve the ability to manage an uncertain future and growing demand for water
- Demonstrate that the region's citizens are prudent stewards of the resource

These Basin-wide goals and objectives are intended to complement other water conservation and efficiency efforts consistent with water quality objectives. They will accelerate intergovernmental and other partnerships including, for example, partnerships with Basin Tribes and First Nations to build a greater understanding and consideration of traditional knowledge and practices. Whether accomplished through voluntary, mandatory, or a combination of measures, to be successful, these goals and objectives need to be broadly supported.

Goals - As stated in the Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement

1. Ensuring improvement of the waters and water dependent natural resources
2. Protecting and restoring the hydrologic and ecosystem integrity of the Basin
3. Retaining the quantity of surface water and groundwater in the Basin
4. Ensuring sustainable use of waters of the Basin
5. Promoting the efficiency of use and reducing losses and waste of water

Draft Objectives

- Guide programs toward long-term sustainable water use.

- Use adaptive programs that are goal-based, accountable and measurable.
- Develop and implement programs openly and collaboratively, including with local stakeholders, Tribes and First Nations, governments and the public.
- Prepare and maintain long-term water demand forecasts.
- Develop long-term strategies that incorporate water conservation and efficient water use.
- Review and build upon existing planning efforts by considering practices and experiences from other jurisdictions.

- Adopt and implement supply and demand management to promote efficient use and conservation of water resources.

- Maximize water use efficiency and minimize waste of water.
- Promote appropriate innovative technology for water reuse.

- Conserve and manage existing water supplies to prevent or delay the demand for, and development of, additional supplies.
- Provide incentives to encourage efficient water use and conservation.
- Include water conservation and efficiency in the review of proposed new or increased uses.
- Promote investment in, and maintenance of, efficient water infrastructure and green infrastructure.

- Improve monitoring and standardize data reporting among state and provincial water conservation and efficiency programs.

- Improve the measurement and evaluation of water conservation and water use efficiency.
- Encourage measures to monitor, account for, and minimize water loss.
- Track and report program progress and effectiveness.

- Develop science, technology and research.

- Encourage the identification and sharing of innovative management practices and state of the art technologies.
- Encourage research, development and implementation of water use and efficiency and water conservation technologies.
- Seek a greater understanding of traditional knowledge and practices of Basin First Nations and Tribes.
- Strengthen scientific understanding of the linkages between water conservation practices and ecological responses.

-Develop education programs and information sharing for all water users.

- Ensure equitable public access to water conservation and efficiency tools and information.
- Inform, educate and increase awareness regarding water use, conservation and efficiency and the importance of water. Promote the cost-saving aspect of water conservation and efficiency for both short-term and long-term economic sustainability.
- Share conservation and efficiency experiences, including successes and lessons learned across the Basin.
- Enhance and contribute to regional information sharing.
- Encourage and increase training opportunities in collaboration with professional or other organizations in order to increase water conservation and efficiency practices and technological applications.
- Ensure that conservation programs are transparent and that information is readily available.
- Aid in the development and dissemination of sector-based best management practices and results achieved.
- Seek opportunities for the sharing of traditional knowledge and practices of Basin First Nations and Tribes.

Appendix C – Michigan Chamber of Commerce Letters to Legislatures

February 28, 2007

Senator Patty Birkholz
Michigan Senate
P.O. Box 30036
Lansing, MI 48909-7536

Dear Chairman Birkholz,

The purpose of this letter is to inform you that, in compliance with Public Act 35 of 2006, the Michigan Chamber of Commerce has undertaken efforts to develop generally accepted water management practices for business sectors. The new law requires that by Feb 28, 2007 each water use sector shall begin developing water management practices. The law allows established statewide professional or trade associations representing a sector to adopt such guidelines as a means of showing compliance with the provisions of the Act. It is the intent of the Michigan Chamber of Commerce to fulfill this portion of the law.

The Michigan Chamber has established a process with our broad-based membership to develop these new guidelines. Our membership includes water users in the following sectors: manufacturing, energy, construction, mining, food, forestry, transportation, and tourism. The guidelines we are developing will provide direction and parameters to the various sectors within our diverse membership.

To assist us in developing these guidelines we are working with Barr Engineering—an experienced and well-qualified environmental consulting firm located in Ann Arbor. Barr is helping the Chamber stakeholder group with technical expertise including reviews of best water management practices from around the country.

We believe that development of the guidelines as set forth in PA 35 of 2006, should also meet the requirements of the Great Lakes Charter Annex Compact. Specifically, the Compact requires each state to develop and implement voluntary and or mandatory water conservation measures applicable to both existing and new uses.

Finally, we are pleased to take a leadership role in developing voluntary water conservation standards. As we begin this process we are hopeful that you will continue to support efforts to ensure that these new guidelines remain voluntary for water users.

If you have any questions or concerns about our activities related to water conservation, please feel free to contact me at (517) 371-7673.

Sincerely,

Doug Roberts, Jr.
Director of Environmental and Energy Policy

February 28, 2007

Representative Rebekah Warren
Michigan House of Representatives
P.O. Box 30014
Lansing, MI 48909-7514

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